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CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD,  
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SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
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see PCT Gazette No. 51/2004 of 16 December 2004, Sec-  
tion II

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: ELECTROLUMINESCENT DEVICE

(57) Abstract: Disclosed are electroluminescent devices that comprise organic layers that contain certain 2H-benzotriazole com-  
pounds. The 2H-benzotriazole compounds of blue-emitting, durable, organo-electroluminescent layers. The electroluminescent  
devices may be employed for full color display panels in for example mobile phones, televisions and personal computer screens.

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A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 H05B33/14 H01L51/20 C09K11/06 C07D403/10 C07D405/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 7 H05B H01L C09K C07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 866 110 A (TOYO INK MFG CO) 23 September 1998 (1998-09-23) cited in the application * Table 3, page 38, compound 41 * * the entire document *	1,2,10
A	----- US 5 104 740 A (SHINKAI MASANAO ET AL) 14 April 1992 (1992-04-14) cited in the application * column 10, compound No. 90 * * the entire document *	3,5,7
X	----- US 5 104 740 A (SHINKAI MASANAO ET AL) 14 April 1992 (1992-04-14) cited in the application * column 10, compound No. 90 * * the entire document *	1-3,10
A	----- PATENT ABSTRACTS OF JAPAN vol. 1999, no. 05, 31 May 1999 (1999-05-31) & JP 11 040355 A (TOYO INK MFG CO LTD), 12 February 1999 (1999-02-12) * page 18, compound No. 66, abstract *	5,7
X	----- PATENT ABSTRACTS OF JAPAN vol. 1999, no. 05, 31 May 1999 (1999-05-31) & JP 11 040355 A (TOYO INK MFG CO LTD), 12 February 1999 (1999-02-12) * page 18, compound No. 66, abstract *	1,2,10
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

9 September 2003

Date of mailing of the international search report

17. 11. 03

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 518 824 A (FUNHOFF DIRK ET AL) 21 May 1996 (1996-05-21) cited in the application * column 5, benzotriazole compound *	1-3,10
X	EP 0 764 712 A (BAYER AG) 26 March 1997 (1997-03-26) cited in the application * page 4, Table 1, compounds 6-10 *	1-3,10
X	TSUTSUI ET AL.: "Revisit on the Role of Oxadiazole Hole Blocking Layer in Organic Multilayer Electroluminescent Devices" SYNTHETIC METALS, vol. 85, 1997, pages 1201-1204, XP002253648 cited in the application * page 1202, Figure 1, quencher compound TIN *	1-3,10
X	US 5 629 389 A (ROITMAN DANIEL B ET AL) 13 May 1997 (1997-05-13) cited in the application * column 2, lines 51-52 *	1-3,10

# INTERNATIONAL SEARCH REPORT

International application No. .  
PCT/EP 03/05698

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☒ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1 (part), 2 (part), 3 (part), 5 (part), 7, 10 (part)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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Continuation of Box I.2

Claims Nos.: -

The initial phase of the search revealed a very large number of documents relevant to the issue of novelty. So many documents were retrieved that it is impossible to determine which parts of claim 10 may be said to define subject-matter for which protection might legitimately be sought (Article 6 PCT). For these reasons, a meaningful search over the whole breadth of claim 10 is impossible. Consequently, in case of claim 10 the search has been restricted to 2H-benzotriazoles of formula (I) comprised in an electroluminescent device.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1 (part), 2 (part), 3 (part), 5 (part), 7, 10 (part)

An electroluminescent device, comprising a 2H-benzotriazole compound of the formula (II) and the compound of the formula (II).

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2. claims: 1 (part), 2 (part), 3 (part), 5 (part), 6 (part), 8, 9, 10 (part)

An electroluminescent device, comprising a 2H-benzotriazole compound of the formula (III), (V), (VI) and a 2H-benzotriazole compound of the formula (III), (V), (VI).

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3. claims: 1 (part), 2 (part), 4, 5 (part), 6 (part), 10 (part)

An electroluminescent device, comprising a 2H-benzotriazole compound of the formula (IV) and a 2H-benzotriazole compound of the formula (IV).

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

P( EP 03/05698

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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